Design of Ubiquitous Sound Service Business Model as a Commerce-Embedded Media

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ABSTRACT
Unlike the previous speaker transmitting audio content in one-way, the speaker in ubiquitous era is expected to offer useful and interesting information to media consumer and take a role as a new media nowadays. This research suggests Ubiquitous Sound service business model that can realize 'Seamlessness' between an individual user and a speaker in the Ubiquitous computing environment. Unlike the previous speaker appealing to the human's auditory sense, U-Speaker enables the seamless information transmission between speaker and users by providing the personal device users with the content link as well as the content from the speaker. This paper suggests four kinds of U-Speaker scenarios that can be realized in ubiquitous computing environment through various technical alternatives and analyze the participants and their roles of the business model.

Categories and Subject Descriptors
K.4.4 [**Electronic Commerce**]

General Terms
Management, Design, Theory.

Keywords
Business Model, Ubiquitous Commerce, Seamlessness, RFID, Personal Area Networking, Ubiquitous Media.

1. INTRODUCTION
Unlike the existing speakers to deliver sound content unilaterally, a speaker in the ubiquitous age is expected to play a new role of providing the additional information and service to the sound and music. This paper attempts to discuss the business model provided through user terminals for the additional information and service in relation with music and sound delivered from speakers. A 'speaker' in this study refers to any device delivering sound content.

Any U-speaker suggested in this study delivers the sound links to a user's mobile device, which plays a role of a medium to appeal to users' digital devices (e.g. mobile phones, PDAs) as well as their aural abilities. Unlike the existing speakers providing content links depending only on the abilities of human memory and aural sense, the ubiquitous environments enable the seamlessness of links between speakers and people, which also enables interactions between entities. This study suggests four types of possible scenarios and process in designing U-speaker business models. In addition, those business models are specified from reviews on the roles, value proposition and incentives of each participant who take part in the business model.

2. Four Scenarios to Implement U-speakers
In ubiquitous environments, providing additional values for customers and advertisers using speakers in their service space is enabled by wireless communication technologies (for example, RFID, ZigBee). If a music of a musician is delivered from speakers in a coffee shop, its content links can be transmitted to user terminals from the annotation of links enabling the purchase of concert tickets for a musician in the metadata of music content. The u-speaker realizes the seamlessness between speakers and users by delivering content links given from speakers to content consumers with a mobile device. This can be implemented by installing the additional systems using the wireless communication technologies (e.g. RFID, Bluetooth, ZigBee) around the existing speakers or users. This study suggests four models including 1) a model to attach RFID tags around users; 2) a model installing a RFID reader around users; 3) a model for a speaker to have PAN (Personal Area Networking) modules; and 4) a model to deliver URLs of content using mobile IDs to mobile devices for those who hear through speakers.

2.1 RFID Based U-Speaker Business Model
RFID based U-speakers are divided largely into a model to attach RFID tags around users and a model to attach a RFID reader around users.

2.1.1 U-Speaker with Simple RFID Tag Attachment
Scenario 1

Arum went to a restaurant with her colleagues in front of her school for dinner. There were advertisements on cosmetics from

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speakers in the restaurant, in which she has been interested all the time, while they were having dinner. As soon as reading the tag of <speaker links> attached to the table after taking out her mobile phone, she could receive the URL to her terminal, so that she might purchase the products later.

Scenario 1 can be shown in Figure 1 and those numbers in the picture can be summarized with the following steps. 0) content play, 1) RFID tag reading, 2) transmitting the information of tag scan time, 3) transmitting URLs, and 4) connecting to the website. Step 1 is reading tags with a RFID reader by a content consumer. Step 2 is transmitting the information of time when the user scans content to a URL server. Step 3 is responding to the URL search for the content based on the time information. The user receives the URL of the content with his or her terminal. The additional information acquisition and/or commerce can be done by connecting to the website with the received URL.

In this simple model, there is no additional system for speakers. Instead, simple RFID tags are attached around users. Although this model is thought to have high possibility applicable to the current level of speakers as it is a business model with a possibility of independent development separated from speakers. On the other hand, this model has an assumption that users should use a portable terminal enabling the RFID reading.

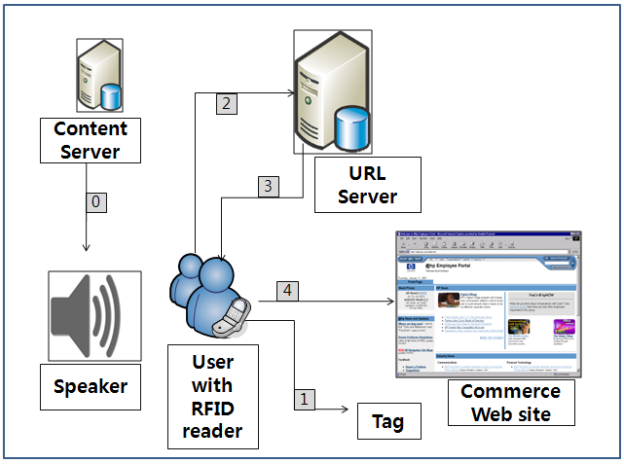

Figure 1. U-Speaker with Simple RFID Tag around Users.

2.1.2 U-Speaker with RFID Readers around Users

The U-speaker suggested in this section has the installation of RFID readers around users, who have RFID tags. The RFID tag has records on the user ID (e.g. mobile phone number), through which the user can receive any additional information on content.

Scenario 2

Nara happened to hear advertisements on a pop music concert from speakers while waiting for a train in guest hall in a station. As Nara was listening carefully to the advertisements to buy tickets, he recognized the tag storing his mobile phone number to a RFID reader attached to a place around him. After a while, he could receive the link to purchase concert tickets as Nara's ID information was recognized in the reader, and subsequently, he could have detail information on the concert as he connected to the link.

Scenario 2 can be shown in Figure 2 and the numbers in the picture can be summarized with the following steps. 0) content play, 1) RFID tag recognition, 2) transmitting the tag information to URL server, 3) transmitting URL, and 4) connecting to the website. The user's ID information is recognized to a reader through the tag, and at this time the RFID reader requests the content information search when it recognizes the tag, and then a server responds to the request.

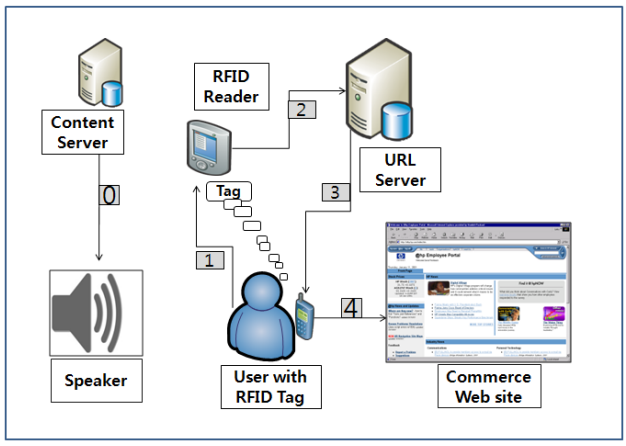

Figure 2. U-Speaker with RFID Readers around Users.

The model in Scenario 2 is one with the installation of RFID readers around users. The RFID reader is reading the unique information contained in the user's tag. In addition, it has the information on the currently played content via communications with URL server. As this should carry out the additional communication functions between the power-supplied RFID reader system and remote URL server, it might be costly from the fact that two devices should be maintained and connected. This might act as a constraint in carrying out this business model, but they are using user-owned RFID tags and such user's learning experience might play a positive role of overcoming the constraint.

Users already have RFID tags in various ways, including credit cards, transportation card payment system (e.g. T-money in Korea), and USIM (Universal Subscriber Identity Module) built-in a 3G mobile terminal etc. Typically, T-money, the transportation charge payment system can be considered. Users of this service touch RFID tag to a reader in bus, subway, and taxi in order to pay transportation fare. This has already let the users experience the RFID's effectiveness. This provides important motivations to the needs of U-speaker model designs with RFID reader attachment around users, which is suggested in Scenario 2.

2.2 PAN Based U-Speaker Business Model

U-speaker can provide people with the sound content links from speakers through PAN (Personal Area Networking) module, which means the interpersonal communication within 100 meters. This section describes a PAN based U-speaker model through a scenario and processes.

Scenario 3

On her way back to home from office, Sunjeong hear advertisements for a pop music concert from speakers along the street. As soon as Sunjeong loaded the PAN module to her mobile terminal, she could receive the content links played on the speaker to her mobile phone display. When she connected the link, she could have the detail information on the place, date and reservation status of performance, etc.

Scenario 3 can be shown in Figure 3 and those numbers in the picture can be summarized with the following steps. 0) content play, 1) recognizing a speaker with Bluetooth communication, 2) requesting content information, 3) transmitting URL, and 4) connecting to the website. Scenario 3 refers to receiving the links of speaker content with a terminal based on PAN.

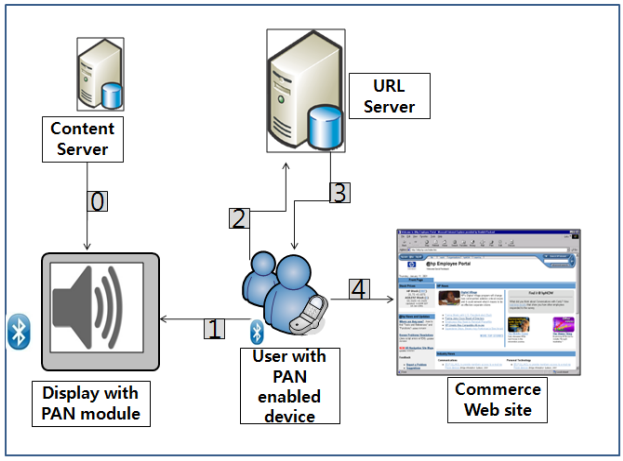

Figure 3. PAN (Personal Area Networking) Based U-Speaker.

PAN refers to the mutual communication between devices located at a personal area in 100 meters. U-speaker based on the ZigBee communications was demonstrated in the Ubicom 2008 [Lee et al. 2008]. This model enables related information reception through user terminals possible of ZigBee communications for the music content information from speakers installed in the space as well as the content played in the speaker. Besides, RFID-based U-Referral Marketing [Lee & Lee 2006] and U-Comparison Shopping [Lee & Seo 2006] were also demonstrated in the demo.

2.3 ID Based U-Speaker Business Model

The U-speaker is based on the wireless communication technologies, and it can be implemented through the installation of additional functions to the existing speakers and mobile terminals for such purposes. However, the actual implementation and commercialization are expected to take some time, considering the levels of current mobile terminals and the situations of infrastructure. This section includes the mobile ID based U-speaker model currently provided by mobile telecommunication operators. This refers to a model to receive the additional content information played over speakers by connecting to the mobile Internet on the basis of the unique speaker ID.

Scenario 4

Hyunseok heard music in which he has been interested recently from speakers installed in the subway train on his way to the school. Hyunseok wanted to download the content to his terminal. Hence, he pressed the unique speaker ID '1101' on the ceiling of the subway train with '**' button, and then he was connected with the information of content along with a message on the display 'Would you like to download?' Hyunseok could download the content to his terminal after pressing 'confirm' button.

Scenario 4 can be shown in Figure 4 and those numbers in the picture can be summarized with the following steps: 0) content play, 1) connecting to the URL server with speaker ID, 2) transmitting URL, and 3) connecting to the website.

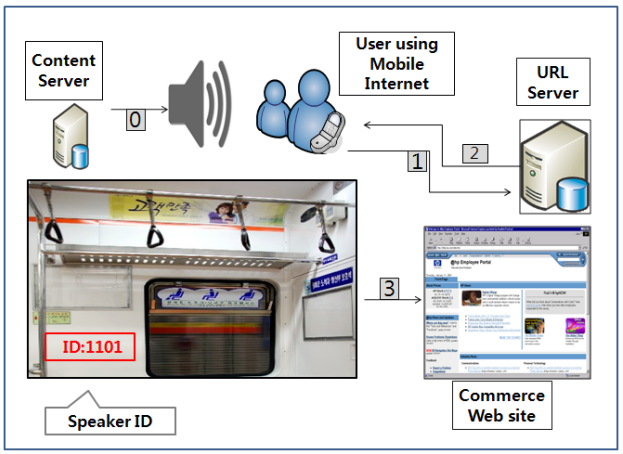

Figure 4. U-Speaker Using Mobile ID with Speaker ID.

The model in Scenario 4 has an advantage with the quickest and the fastest possible implementation without additional functions to the existing speakers and mobile terminals among the models suggested in this paper. However, it is considered as having the lowest seamlessness of information as it involves additional actions including users have to find out the speaker ID to connect to the content link, again enter the information to obtain the link, etc.

' NATE broadcasting music search' service in Korea can be a demonstration for the service using the mobile ID as such. This service provides the music information broadcast from the broadcasting channel upon connecting to NATE after Pressing '**8585' with a mobile phone if a user does not know the music information when he or she hears good music while listing to a radio program or a TV program. Mureka (http://mureka.co.kr) providing this service informs users of song titles on a real-time base by automatically recognizing the music source for music played for 5~8 seconds or longer over radio, TV and cable TV among others on the basis of music recognition technologies, along with possible recognition for the background music in the advertising music or over the screen.

3. Analysis and Comparison of Scenarios

The chapter 2 suggested four alternative U-speaker business models. In this chapter, the overall comparison and analysis of all scenarios is carried out on the basis of additional necessary functions around speaker, feasibility of the additional functions around speaker, additional necessary functions to mobile terminal, feasibility of additional mobile terminal functions, technological Feasibility, and user actions to acquire links. It is summarized in Table 1.

With reference to <1>, Scenario 1 and 3 have greater feasibility than Scenario 2 and 3 considering the necessary additional functions around speakers. Scenario 1 and 4 can be inferred to be done in a quickest and fastest way as they have only to attach RFID tags or speaker ID respectively around speakers. On the other hand, Scenario 2 and 3 require a RFID reader or PAN-enabled system. Accordingly, they are thought to have relatively lower feasibility, with more speaker functions to be installed additionally comparing with Scenario 1 and 4. Through such analogies, points to each alternative were given to row <2> in terms of the feasibility of additional functions around speaker.

With reference to <3>, Scenario 2 and 4 have greater feasibility than Scenario 1 and 3, considering the technological feasibility in terms of mobile terminals. Scenario 2 and 4 might be diffused faster than other models as they have no need of new functions added to mobile terminals. However, Scenario 1 and 3 are thought to show relatively slower progress when we consider the insufficient distribution of RFID reader to the mobile terminals for Scenario 1 and the difficulties to make PAN easily combined to the user mobile terminals for Scenario 3. Through such analogies, points to each alternative were given to row <4> in terms of the feasibility of additional mobile terminal functions. As explained in section 2.3, Scenario 4 has an example of service in reality already as of 2009. However, it is difficult to regard Scenario 4 as a true U-speaker business model as it is the worst model in terms of the seamlessness.

We might now have the comprehensive considerations on the technological feasibility(displayed on row <5>) by adding values of <4> (Feasibility of additional mobile terminal functions) to the values of <2> (Feasibility of additional Feasibility of speakers). The smaller these values are, the quicker they are realized. The larger they are, the slower they are realized. As shown in Table 1, Scenario 4 has a value of '2' while Scenario 1 and 3 have '4' and Scenario 3 has '5'. When we interpret these values, the U-speaker based on the Mobile ID is the most likely in realization (Scenario 4), followed by the simple RFID tag attachment (Scenario 1) and model with RFID reader (Scenario 2), and then speakers with the PAN module (Scenario 4) for the determination of order in feasibility.

However, Scenario 1, 2 and 4 have some significant defects considering actions users should take in order to have links related to sounds or speakers. When a user hear any sound or music in his or her interest, it is difficult to have an assumption that any related link for the sound would exist right away around the user. Especially, Scenario 2 can be said to be a model lacking of realization in a great deal in terms of cost as it requires the installation of a reader around the user space easily discovered by users. For example, it might be costly that a RFID reader exists on every table while carrying out the wire/wireless communications with servers although every table in a restaurant might have RFID tags or speaker ID when we consider a restaurant where users almost do not move. Accordingly Scenario 2 is thought to be difficult to see any realistic applications except for the narrow space like a taxi. It is not easy to assume that every seat in a train would have a reader. Although Scenario 1 and 4 might be available to the restaurant mentioned before, they might be difficult to be applied to any place with many moving users like the subway, train station inside, plaza, etc. For such reasons, Scenario 3 is the only alternative for the possible application for any place with many moving users.

Table 1. Comparisons of all Scenarios (Lower value in a cell implies higher feasibility.)

Analysis Criteria	Scenario 1	Scenario 2	Scenario 3	Scenario 4
<1> Additional necessary functions around speaker	RFID Tag	RFID reader	PAN module	Speaker ID
<2> Feasibility of additional functions around speaker	2	3	3	1
<3> Additional necessary functions to mobile terminal	RFID Reader	None	PAN module	None
<4> Feasibility of additional mobile terminal functions	2	1	2	1
<5> Technological Feasibility (<2> + <4>)	4	4	5	2
User actions to acquire links	Find tags related to speakers and recognize them	Find a reader related to speakers and recognize them	Search links using a terminal	Find and enter a speaker ID
Characteristics of proper space for use	Applicable to the space with less movements of users	Applicable only to the narrow space like a taxi or room	Applicable to wide area with movements of users	Applicable to the space with less movements of users

4. Analysis of Business Model: Scenario 1

This Chapter analyzes and evaluates the business model as an example with Scenario 1 among the four scenarios suggested before. Scenarios described above might be different from each other in the technological structure or cost structure depending on the technological structure, but there is no great difference in nature in terms of the organization of players participating in the business model, distribution method for the values and profits, etc. Accordingly, this paper attempts to analyze and evaluate the business model while focusing on Scenario 1.

4.1 Structure of U-Speaker Business Model

The basic structure of U-speaker business model is shown in Figure 5 and the process can be summarized as follows. 1) Participation in the system of U-Sound Service; 1-1) Speaker registration; 1-2) Commerce provider registration; 2) Information providing; 2-1) Notifying the possible use of speakers; 2-2) Content information providing; 3) Installing and infrastructure and managing content; 3-1) Installing tags; 3-2) Transmitting content; 3-3) Playing content; 4) Reading tags; 5) Getting the URL server link; 6) Requesting the URL; 7) Receiving URL; 8) Connecting to commerce provider's webpage; 9) Paying incentives; 9-1) Paying incentives to U-Sound service company; 9-2) Paying incentives to the owner of speakers.

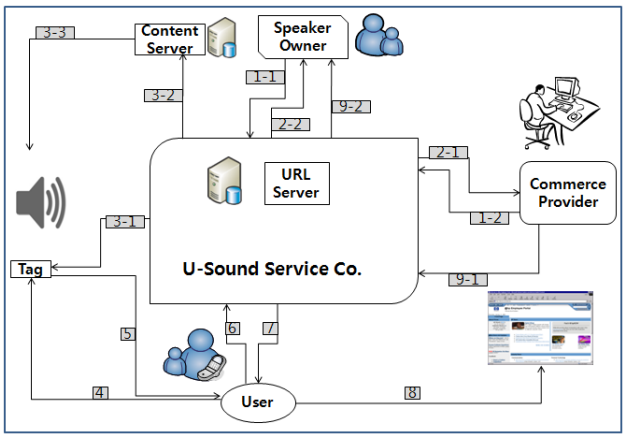

Figure 5. Basic Structure of U-Sound Service Business Model.

Step 1 in Figure 5 refers to participation by entities in this business model. The owner of speakers registers speakers owned by him or her to the web for U-Sound service companies. Commerce providers register themselves and search for speakers and content. Step 2 is providing information for each participant, notifying commerce providers of possibilities to use speakers, and providing speaker owners with the content and related information requested by commerce providers. Step 3 is installing tags to the space of speaker owners by U-Sound service companies and transmitting content to servers to play them. Step 4 and 5 are for reading tags by users with a reader, through which the content information is requested. Step 6 and 7 are searching the content and transmitting them to users on the basis of time information with tag reading. Users receiving URLs can have the immediate access to the commerce provider's web (Step 8) and those commerce providers distribute incentives to U-speaker companies and speaker owners if any transaction occurs (Step 9).

4.2 Roles and Benefits of Participants

Timmes[1998] defines business model components as 1) an architecture for the product, service and information flows, including a description of the various business actors and their roles, 2) a description of the potential benefits for the various business actors, and 3) a description of the sources of revenues. The U-speaker business model can be summarized in Table 2 reflecting the definition. The business participants in the U-speaker business model include the U-Sound service company, speaker owner, commerce provider and user. The U-Sound service company plays a leading role of this business model, who installs tags and additional infrastructure while realizing systems to provide content or their links from speakers to the content consumers. In addition, it plays a role of providing the most proper speaker information for the advertisements requested by commerce providers while providing the information content consumer who is reading the advertisements.

The speaker owner is broadcasting the content of content providers over its space, through which it takes profits for the use of speakers. The content consumers can have the immediate consumption of the related content by receiving the content links with their terminals, who might become the potential customers for commerce providers in the future.

Table 2. Roles and Potential Benefits of Participants

Business Participant	Roles	Potential Benefits from Participation
U-Sound service company	- Install speaker infra and advertising systems - Providing links for broadcasting content	- Brokerage commissions for speaker providers and content providers
Speaker owner	- Registering speakers to U-Sound service company - Providing the space to broadcast content	- Charge for speakers providing advertising space - Incentives upon any commerce occurrence
Commerce provider	- Providing content and link services for commerce	- Profits from transactions
Content consumer	- Receiving content and acquiring the additional information and commerce	- Acquiring additional information immediately through content links

5. Discussions and Conclusions

Ubiquitous society is a society with media-embedded product and media embedded place, and commerce-embedded media [Lee 2007]. This study suggested the U-Sound business models to implement seamlessness between speakers and people in the ubiquitous environments, which would become an example embedding commercial functions to existing speakers. Similarly, there have been studies such as U-publication business model embedding the commercial functions into the existing publication media [Park & Lee 2008], U-exhibition business model embedding the commercial functions into the spatial media like museums or art galleries [Jun & Lee 2008], U-photo business model embedding the commercial function into the existing photo media [Lee, Ju & Lee 2007], business models embedding the commercial functions into the existing display [Yoon & Lee 2009], and business models embedding the commercial functions into the service space [Lee & Lee 2008]

Unlike the existing speakers to deliver sounds unilaterally, a speaker in the ubiquitous age is expected to play a new role of providing the additional information and service to the sound and music. This paper attempts to discuss the business model provided through user terminals for the additional information and service delivered from speakers. The U-Sound Service business model suggested in this study refers to a model to realize the seamlessness between speakers and users by delivering content links given from speakers to content consumers with a mobile device. Unlike the existing speakers depending on the human aural ability, the U-speaker enables the service and commerce following the acquisition of additional information by delivering content links to content consumers.

This study is described in a very similar manner to the study on the U-display business model by Yoon & Lee (2009) in terms of its format and research method. While the paper deals with the display consumed with the use of vision, this paper deals with speakers with no visual use, which will cause a difference in business model. It is interesting to note that this minor difference shows critical differences in selecting the alternative business models.

As the display with the consumption using the vision of people has an opportunity to recognize the content or a certain tag, reader or display ID from the display showing the content when people feel the needs of additional information or commerce while seeing the content with eyes, it can lead people to have the additional information or commerce by attaching a tag, reader or ID to the display. However, speakers which are consumed using only the aural ability might have many cases out of range in the recognition of user's vision for the locations while having difficulties to identify the sources of music or sounds although people feel the needs of the additional information or commerce when they hear certain music or sound. Therefore, it is inevitable to have differences in the technological structure and characteristics of applicable space between U-display model and U-speaker model. It is necessary to have more studies on the ubiquitous media design methodologies while we comprehensively analyze, predict and reflect the media consumption behaviors of people in the ubiquitous environments in the future with these implications shown in this study.

6. Acknowledgments

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